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FITCH EVEN TABIN AND FLANNERY
120 SOUTH LA SALLE STREET
SUITE 1600
CHICAGO, IL 60603-3406

EXAMINER	
FITZPATRICK, ATIBA O	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/547,441	NOWINSKI ET AL.	
	Examiner	Art Unit	
	ATIBA O. FITZPATRICK	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *48 and 49* is/are allowed.

6)☒ Claim(s) *1-47 and 50-53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/21/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

The objection to claim 13 is withdrawn in light of the amendment. In response to Applicant's arguments pertaining to the 35 USC 101 rejection, Applicant is referred to the rejection section below. The 35 USC 112 second paragraph rejections are withdrawn in light of the amendments to the claims.

Applicant's arguments pertaining to the 35 USC 103 rejections are not persuasive. Applicant states that the combination of the Chung reference with the Shnack and Hahn references does not produce a workable solution like the present Application. Applicant is advised that the combination of references is used in rejecting only the instant limitations present in the instant claims (in particular claims 1 and 2; that is, the claimed invention as opposed to the disclosed invention). Note that the while the claims are read in light of the specification, limitations from the specification are not read into the claims. To drive this point home, note that claims 48 and 49 are allowed because the claims themselves contain enough details to render the claims nonobvious in light of the prior art. The abstract of Chung provides sufficient detail to render claims 1 and 2 as obvious when combined with the Shnack and Hahn references as indicated below. For the convenience of the reader, limitations recently added to claim 1 and limitations of claim 2 are included below. Note that these limitations are fairly broad in scope and do not contain the level of detail available in the specification or allowed claims 48 and 49.

These limitations are clearly rendered obvious and unpatentable by the prior art as is explained below.

Newly added limitations of claim 1:

wherein the steps of defining multiple ROIs, defining seed points and growing images are applied to one or more images of the left ventricle, the right ventricle, the third ventricle and the forth ventricle.

Claim 2:

The method according to claim 1, wherein the steps of defining multiple ROIs, defining seed points and growing images are applied first to one or more images of the third ventricle (V3), then to one or more images of the fourth ventricle (V4), and then to the left and fight ventricles (VLL and VLR) for controlling leakage and connections.

Abstract of Chung reference:

A method for automatic segmentation of the brain's 3rd and 4thventricles in MRI (magnetic resonance imaging) datasets is introduced. The method exploits anatomical knowledge about these structures and uses gradient-based edge detection and volume-growing to complete the segmentation. Nearby anatomic landmarks, including the longitudinal fissure, cerebellum and callosum are also automatically extracted in our approach. The method has been tested on a variety of T1- and T2- weighted MR images.

Therefore, Chung states that the method is applied to the 3rd and 4th ventricles. Gradient-based edge detection defines the edges or boundaries between regions in an image. This fact is quite clear and well known. Demarcating the boundaries of regions wherein region (volume) growing is performed on these regions is a step of defining

multiple regions of interest. Note that in region growing, a starting point must be specified from which the region will iteratively grow until certain stopping criteria is realized, which is why "growing" is used to title this method. This starting point is called a seed.

In considering the teachings of the Shnack and Hahn references, note that the combination of these references clearly teaches all limitations of all claims to which they were applied. This is a fact that Applicant does not dispute in Applicant's remarks. Thus, this combination teaches all aspects of the claimed method as applied to the left, right, and third ventricle. As indicated in the rejection section below, the references are silent with regard to the steps being applied to the fourth ventricle. However, this silence is not an admission or evidence of any deficiency of the steps of Shnack and Hahn with regard to the fourth ventricle. Therefore, the combination of Shnack and Hahn with Chung teaches all limitations of the claims. The references are in the same field of endeavor and were available to one of ordinary skill in the art at the time of the invention. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). One of ordinary skill in the art at the time the invention was made would clearly look to Chung to see that "the steps of defining multiple ROIs, defining seed points and growing images are applied to one or more images of the left ventricle, the right

ventricle, the third ventricle and the forth ventricle" (particularly for the fourth ventricle) is obvious and achievable when the Chung reference is combined with the teachings of Shnack and Hahn. Similar arguments are made for the limitations of claim 2 as indicated in the rejection section below.

Applicant argues that the Chung reference and the combination of references do not teach extracting cerebral ventricular system information from images of cerebral ventricular regions. However, these limitations are not present in the body of the claim. Similar limitations are present in the preamble. However, these limitations have not been given patentable weight because the recitation occurs only in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Applicant asserts that the information of the fourth ventricle is much harder to obtain properly. If Applicant is referring to limitations present in the preamble in this regard, Applicant is advised the preamble is not given patentable weight. Applicant is also advised that the limitations present in the claim should indicate the complexity of a method as required for performing such a difficult task. Presently, the broad limitations

of claim1 state the relatively simple tasks of "defining multiple ROIs, defining seed points and growing images are applied to one or more images of the left ventricle, the right ventricle, the third ventricle and the forth ventricle". The combination of references clearly indicates that it is obvious to perform these steps on all ventricle regions.

Applicant argues that the depending claims are allowable since the independent claims are alleged to be allowable, but this assertion is obviated with the office's foregoing arguments.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 52 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no recitation of "computer readable medium" in the original specification as originally filed.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 52 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. One cannot know, from the limitation "computer readable medium", whether this limitation falls into a statutory category. Note that this limitation can be reasonably interpreted to be a signal or carrier-wave which does not fall into a statutory category. The specification makes no mention of "computer readable medium" and does not indicate that this limitation falls into a statutory category. Applicant is advised that amendments to the specification to insert limitations constitute new matter, which is objectionable.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-47, and 50-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Automatic Segmentation of the Ventricular System from MR Images of the Human Brain", NeuroImage 2001, May 2001, Vol. 14, pages 95-104 (Schnack) and USPGPubN 20030068074 (Hahn) in view of "Anatomical−driven segmentation of the 3rd and 4th ventricles in MR data" Proceedings of the First Joint BMES/EMBS Conference, Atlanta, GA, USA, 13−16 Oct. 1999 (Chung).

As per claim 1, Schnack teaches a method for extracting cerebral ventricular system information from images of one or more cerebral ventricular regions, the cerebral ventricular system comprising a third ventricle (V3), a fourth ventricle (V4), a left lateral ventricle (VLL) having a body (VLL-B) and an inferior (temporal) horn (VLL-I'), a fight lateral ventricle (VLR) having a body (VLR-B) and an inferior (temporal) horn (VLR-I), an anterior commissure (AC), a posterior commissure (PC), and a midsagittal plane (MSP), the method comprising the steps of **(Limitations present only within the preamble are not given patentable weight)**:

1) defining multiple regions of interest (ROI) in-the images **(Schnack: page 96, col 2, para 2: "The total brain segmentation is a binary image, consisting of voxels with value 1 at places with brain tissue and voxels with value 0 at other places: cerebrospinal fluid (CSF) and all other voxels surrounding the brain. The remaining and most complex part of the problem is the classification of the correct zero-valued voxels in the total brain image as ventricular CSF.")**;

2) defining seed points within each ROI **(Schnack: page 97, col 1, para 1: "starting points of two region-growing operations"; page 98, col 2, para 1: "seed points"; page 98, col 1, para 2: "seed points")**;

3) growing images of ventricular regions while correcting for leakages into extraventricular space **(Schnack: Fig. 1: "close leak"; page 97, col 1, para 1 – col 2, para 1: "We use a unidirectional downward (increasing z) 3-D region-growing**

operator, which prevents possible leaks to cisterns and sulci from migrating upward. Slice by slice the grown areas are examined upon leaking.");
wherein the steps of defining multiple ROIs, defining seed points and growing images are applied to one or more images of the left ventricle, the right ventricle, and the third ventricle **(Schnack: See arguments made above)**.

Schnack does not teach connecting the ventricular regions grown; and the steps of defining multiple ROIs, defining seed points and growing images are applied to one or more images of the forth ventricle.

Hahn teaches connecting the ventricular regions grown **(Hahn: Fig. 1: 126-130; Figs. 3 and 4)**.

Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to implement the teachings of Hahn into Schnack since Schnack suggests a system for segmenting ventricular regions in brain images in general and Hahn suggests the beneficial use of a system for segmenting ventricular regions in brain images wherein the grown regions are connected (Hahn: 9page 4, paras 57 and 58) in the analogous art of image processing. It would have been obvious for one of ordinary skill in the art at the time the invention was made to implement the connecting of the grow regions since "The ventricular system is a connected structure and could, therefore, in principle, be segmented with one region-growing operation", as stated by

Schnack (page 2, col 2, para 2). It is common an obvious to use multiple starting seed-points to segment a single and connected region of interest since "owing to the partial volume effect, parts of the system appear not connected on the image" (Schnack: page 2, col 2, para 2).

Schnack in view of Hahn and Chung teaches the steps of defining multiple ROIs, defining seed points and growing images are applied to one or more images of the forth ventricle **(Chung: abstract: "A method for automatic segmentation of the brain's 3rd and 4thventricles in MRI (magnetic resonance imaging) datasets is introduced. The method exploits anatomical knowledge about these structures and uses gradient-based edge detection and volume-growing to complete the segmentation. Nearby anatomic landmarks, including the longitudinal fissure, cerebellum and callosum are also automatically extracted in our approach. The method has been tested on a variety of T1- and T2- weighted MR images.": Therefore, Chung states that the method is applied to the 3rd and 4th ventricles. Gradient-based edge detection defines the edges or boundaries between regions in an image. This fact is quite clear and well known. Demarcating the boundaries of regions wherein region (volume) growing is performed on these regions is a step of defining multiple regions of interest. Note that in region growing, a starting point must be specified from which the region will iteratively grow until certain stopping criteria is realized, which is why "growing" is used to title this**

method. This starting point is called a seed. Also, see arguments made in the response to arguments section above.).

Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to implement the teachings of Chung into Schnack since Schnack suggests a system for segmenting the left, right, and 3rd ventricles using region growing techniques in general and Chung suggests the beneficial use of a system for segmenting the 4th ventricle using region growing techniques in the analogous art of image processing. It would have been obvious for one of ordinary skill in the art at the time the invention was made to implement the also segment the additional 4^{th} ventricle since "The ventricular system is a connected structure and could, therefore, in principle, be segmented with one region-growing operation", as stated by Schnack (page 2, col 2, para 2). It is common an obvious to use multiple starting seed-points to segment a single and connected region of interest since "owing to the partial volume effect, parts of the system appear not connected on the image" (Schnack: page 2, col 2, para 2).

As per claim 3, Schnack in view of Hahn teaches the method according to claim 1 or 2 wherein the method is performed from one or more **(interpreted that only one is required)** medical imaging modalities **(Schnack: abstract: "MR images"; introduction: page 95: col 1: para 1: "MR imaging")**.

As per claim 4, Schnack in view of Hahn teaches the method according to any one of the preceding claims, wherein the step of defining multiple ROIs comprises defining each ROI in a predetermined plane **(Schnack: page 96, col 2, para 1: "For segmentation of the third ventricle, the coordinates of the anterior commissure (AC) and posterior commissure (PC) are needed"; Fig. 1: "the third ventricle W3), limited by the AC plane and the PC plane"; page 97: col 2, para 1: "If such a region crosses the midsagittal plane of the brain, this region is considered to be cistern")**.

As per claim 5, Schnack in view of Hahn teaches the method according to claim 4, wherein the step of defining multiple ROIs comprises selecting said predetermined plane to be on a coronal orientation to constitute a coronal slice **(Schnack: page 99, col 1, para 1: "The anterior and posterior boundaries are given by the coronal (zx) planes through the anterior commissure (AC) and posterior commissure (PC), respectively"; page 101, col 1, para 2: "TI-weighted scans with 160-180 1.2-mm contiguous coronal slices")**.

As per claim 6, Schnack in view of Hahn teaches the method according to claim 5, wherein the step of selecting said predetermined plane to be on the coronal orientation for assessment of an image of the body of the left lateral ventricle or the body of the right lateral ventricle comprises the steps **(Limitations present only within the preamble are not given patentable weight)**:

(1) selecting the coronal plane (VAC) passing through the anterior eommissure(AC) **(Schnack: page 99, col 1, para 1: "The anterior and posterior boundaries are given by the coronal (zx) planes through the anterior commissure (AC) and posterior commissure (PC), respectively")**;

(2) selecting the initial rectangular ROI on the VAC laterally between the coordinates [MSP, MSP+nl] for the body of the left lateral ventricle, and [MSP- nl, MSP] for the body of the right lateral ventricle, and dorsally between [AC, AC+n2], where nl and n2 are constants **(Schnack: page 99, col 1, para 1: "The anterior and posterior boundaries are given by the coronal (zx) planes through the anterior commissure (AC) and posterior commissure (PC), respectively. The superior boundary is given by a plane through the plexus choroideus and ventriculi tertii in the midsagittal slice perpendicular to this this slice")**; and

(3) altering the ROIs for subsequent processing based on desired histogram distribution within the ROIs **(Schnack: page 101: col 2, para 1: "We used a series of mathematical morphology operators based upon intensity histogram analysis of the image (Schnack et al., 2001). A coarse white matter segmentation was obtained autornatically by thresholding the TI-image with an intensity value roughly between the gray and white matter peaks in the histogram.")**.

As per claim 7 and 8, arguments made in rejecting claim 1 are analogous to arguments for rejecting claim 7 and 8.

As per claim 9, Schnack teaches a method according to claim 6, wherein n1 is 25 mm **(Schack: page 96, col 1, para 2 – col 2, para 1)**. Schnack does not teach a particular value for the metric. However, it would have been obvious for one of ordinary skill in the art at the time the invention was made to determine a particular value for the metric, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum value of a result effective variable involves only routine skill in the art. *In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)* (MPEP 2144.05 (II-B)). Furthermore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to determine a particular value for the metric, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum range involves only routine skill in the art. *In re Aller, 105 USPQ 233* (MPEP 2144.05 (II-A)).

As per claims 10, 12, 13, 16, 17, 20-22, 25, 26, 30-32, 41, arguments made in rejecting claim 9 are analogous to arguments for rejecting claims 10, 12, 13, 16, 17, 20-22, 25, 26, 30-32, 41.

As per claims 11, 14, and 18, arguments made in rejecting claim 6 are analogous to arguments for rejecting claims 11, 14, and 18.

As per claim 15 and 19, arguments made in rejecting claim 1 are analogous to arguments for rejecting claim 15 and 19.

As per claim 24, Schnack in view of Hahn teaches the method according to any preceding claim, wherein the step of defining seed points for within an ROI for V'LL-B and VLR-B comprises the steps **(Limitations present only within the preamble are not given patentable weight)**:
where n13 and n14 are constants to form ample line segments; 2) calculating a profile along each sample line segment; 3) determining the longest CSF segment from said profile; and 4) placing the seed point in the middle of the segment **(Schnack: page 96, col 2, final paragraph – page 97, col 1, para1; Fig. 1; page 98: col 1, para 1- col 2, para 1)**.

Schnack does not teach sampling the ROI horizontally, starting from AC+nl3 every n14 distance.

Hahn teaches sampling the ROI horizontally, starting from AC+nl3 every n14 distance **(Hahn: page 5, para 86)**.

As per claims 27-29, arguments made in rejecting claim 24 are analogous to arguments for rejecting claims 27-29.

As per claim 34, Schnack in view of Hahn teaches the method according to any preceding claim, wherein the step of growing the image of the third ventricle V3

comprises the steps **(Limitations present only within the preamble are not given patentable weight)**: 1) subdividing V3 into four subregions 1, 2, 3 and 4 by the planes passing VAC,

VPC, AC-PC, subregion 1 containing the most anterior part of V3 and being separated from subregions 2, 3 and 4 by the VAC and the AC-PC planes, subregion 2 containing the most dorsal part of V3 and being separated from the subregions 1, 3 and 4 by the AC-PC and the VPC planes, subregion 3 containing the most posterior part of V3 and being separated from subregions 1, 2 and 4 by the AC-PC and the VPC planes, and subregion 4 containing the most ventral part of V3 and being separated from the subregions 1, 2, and 3 by the AC-PC and theVAC planes; and 2) growing V3 in three dimensions, wherein subregion 1 is grown anteriorly on coronal slices, subregion 2 and subregion 3 are grown superiorly on axial slices; and subregion 4 is grown inferiorly on axial slices from the seed point **(Schnack: page 98, col 2, para 3 – page 99, col 1, para 1)**.

As per claim 33, arguments made in rejecting claim 34 are analogous to arguments for rejecting claim 33.

As per claim 40, Schnack in view of Hahn teaches the method according to claim 34, wherein during the growth of the V3 region the step of correcting for leakages posteriorly through the PC (stalk of the pineal body) to the cistema ambiens,

comprises**(Limitations present only within the preamble are not given patentable weight)**:

1) limiting the maximum width of foreground region of subregion 3 on an axial slice to be on PC line; and 2) maintaining the distance between the centre of gravity of the foreground region of subregion 3 and the MSP less than n18, where n18 is a predetermined constant **(Schnack: page 97 – page 99)**.

As per claims 36-39 and 41-47, arguments made in rejecting claim 40 are analogous to arguments for rejecting claims 36-39 and 41-47.

As per claim 51, Schnack in view of Hahn teaches an apparatus according to claim 50, wherein the apparatus is a computing apparatus **(Schnack: page 99, col 1, para 2 - col 2, para 1: "IMPLEMENTATION")**.

As per claims 50 and 52, arguments made in rejecting claim 51 are analogous to arguments for rejecting claims 50 and 52.

As per claim 53, Schnack in view of Hahn method as claimed in any preceding claim. Schnack does not teach a method of quantifying the ventricular system by counting the number of voxels of the ventricular system extracted by a method and multiplying this count by voxel volume.

Hahn teaches a method of quantifying the ventricular system by counting the number of voxels of the ventricular system extracted by a method and multiplying this count by voxel volume **(Hahn: abstract: "quantification"; page 3, paras 42 and 51; page 4, para 58; page 5, paras 82-97)**.

As per claim 2, Schnack in view of Hahn teaches a method according to claim 1, wherein the steps of defining multiple ROIs, defining seed points and growing images are applied first to one or more **(interpreted as meaning that only one of the following is required)** images of a third ventricle (V3), and then to the left and right ventricles (VLL and VLR) for controlling leakage and connections **(arguments made in rejecting claim 2 are analogous to arguments for rejecting claim 1)**.

Schnack discloses the limitations claimed above except for defining multiple ROIs, defining seed points and growing images are applied first images of a third ventricle prior to the same processes being applied to the left and right ventricles. It would have been obvious for one of ordinary skill in the art at the time the invention was made to have a different order of operation since it has been held that a mere reversal of the essential working parts of a system involves only routine skill in the art. *In re Einstein,* 8 USPQ 167.

Schnack in view of Hahn does not teach then to one or more images of the fourth ventricle (V4).

Chung teaches then to one or more images of the fourth ventricle (V4) **(Chung: See arguments made for rejecting claim 1: abstract)**.

Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to implement the teachings of Chung into Schnack since Schnack suggests a system for segmenting the left, right, and 3rd ventricles using region growing techniques in general and Chung suggests the beneficial use of a system for segmenting the 4th ventricle using region growing techniques in the analogous art of image processing. It would have been obvious for one of ordinary skill in the art at the time the invention was made to implement the also segment the additional 4^{th} ventricle since "The ventricular system is a connected structure and could, therefore, in principle, be segmented with one region-growing operation", as stated by Schnack (page 2, col 2, para 2). It is common an obvious to use multiple starting seed-points to segment a single and connected region of interest since "owing to the partial volume effect, parts of the system appear not connected on the image" (Schnack: page 2, col 2, para 2).

As per claim 35, Schnack in view of Hahn teaches a method according to any preceding claim, wherein the step of growing the image of the fourth ventricle (V4) comprises the steps **(Limitations present only within the preamble are not given patentable weight)**: 1) subdividing into two subregions 1, and 2, by the axial plane passing through the seed point, subregion 1 including the part superior to and subregion 2

including the part inferior to the axial plane; and 2) growing on axial slices, dorsally in subregion 1 and ventrally in subregion 2 starting from the axial slice containing the seed point **(Schnack: page 97 – page 99)**.

Schnack in view of Hahn does not teach subdividing V4 into two subregions; including the part of V4 superior to the axial plane; and growing V4 on axial slices.

Chung teaches subdividing V4 into two subregions; including the part of V4 superior to the axial plane; and growing V4 on axial slices **(Chung: abstract)**.

Allowable Subject Matter

Claims 48 and 49 are allowed.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Atiba Fitzpatrick whose telephone number is (571) 270-5255. The examiner can normally be reached on M-F 10:00am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on (571)272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Atiba Fitzpatrick

/A. O. F./

Examiner, Art Unit 2624

/Samir A. Ahmed/

Supervisory Patent Examiner, Art Unit 2624